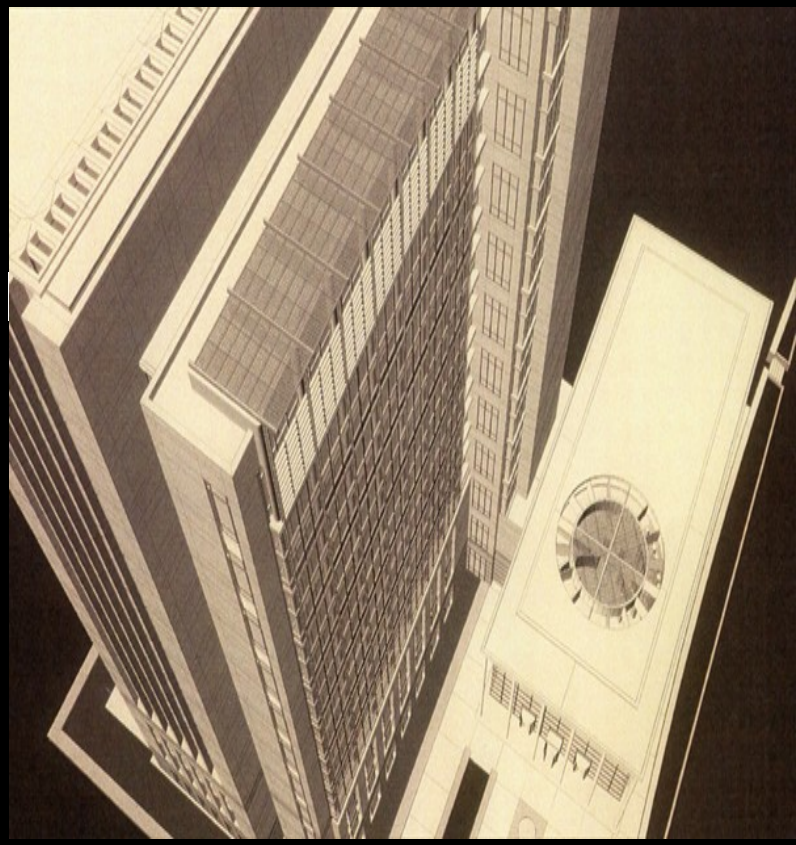
The Pri¢e Is Right!

What Being $ustainable Costs…



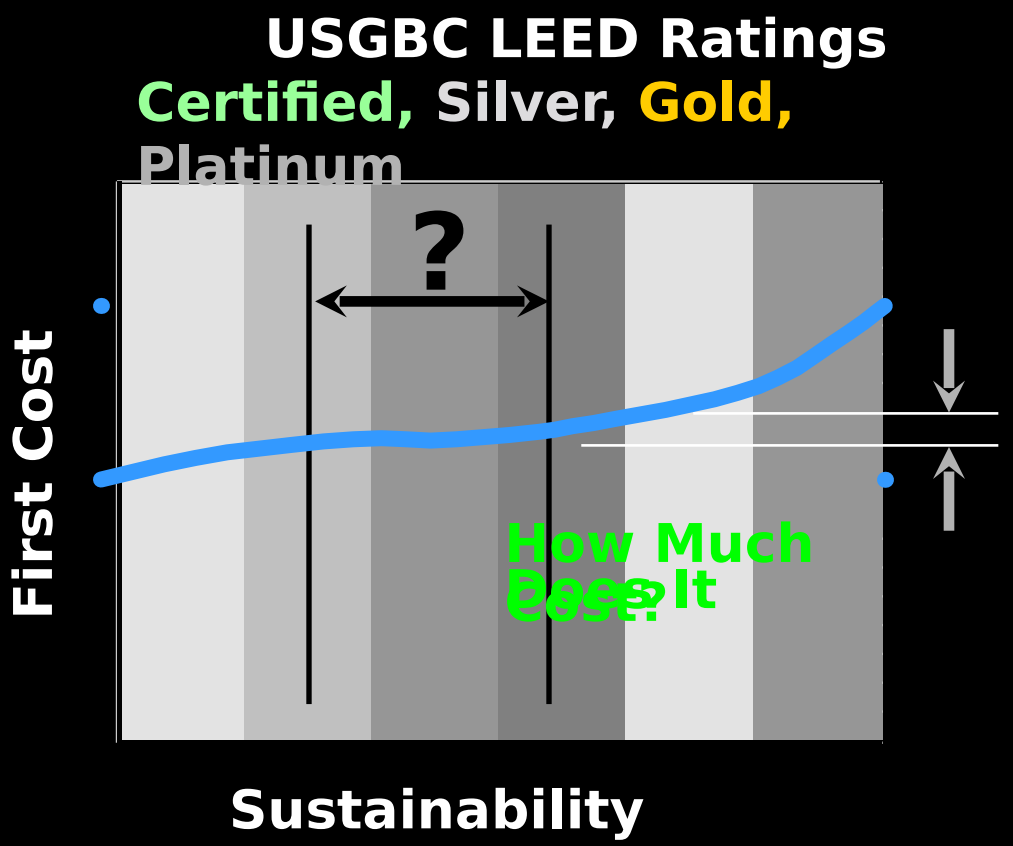
Interagency Sustainabi
Working Group

Washington, DC
April 7, 2004

David Eakin, PE
Chief Engineer
Office of the Chief Architect
Public Buildings Service

John Amatruda, RA
Elizabeth Heider, AIA

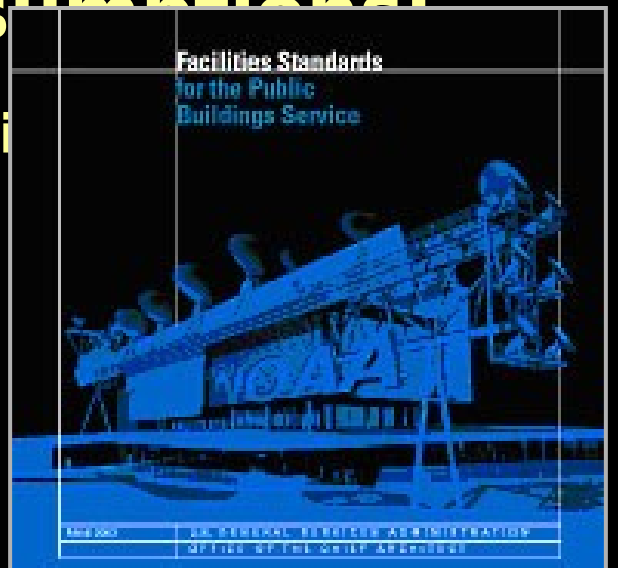
How Green Should We Be?



Los Angeles Courthouse

Background

- **GSA's Current Sustainability Requirements**
  - **LEED Certified Rating at Minimum**
  - **Strive for LEED Silver**
- **Previous Green Cost Ass**
  - **2.5% cost increase (assumed Si**
  - **Based on 1998 GSA Study**
  - **Not specific to LEED**



LEED Cost Study Scope

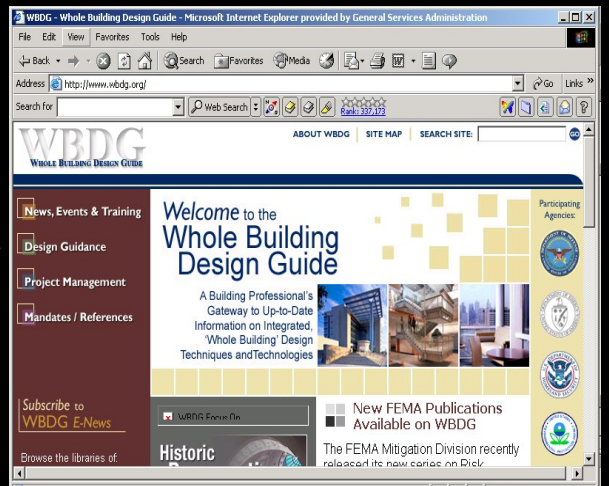
- **Define Costs for Individual LEED 2.1 Credits**
  - Costs = Projected Costs - GSA Baseline
  - Costs Related to Washington, DC - Sept. 2003
- **Define Costs for 12 LEED "Scenarios"**
  - 6 for a New Courthouse (2 Certified, 2 Silver, 2 Gold)
  - 6 for an Office Building Modernization
- **Define Soft Cost Impacts**
  - Design Costs and
  - LEED Documentation Costs
- **Develop LEED Applications Guide**

Comprehensive Perspective

Sustainability Principles…

1. **Site and Transportation**
   (Local Ecosystem, Public Transit
2. **Energy Efficiency**
   (HVAC, Lighting, Envelope, BAS)
3. **Water Usage**
   (Quantity, Purity)
4. **Materials/Systems**
   (Recycling, Contaminants, Dura
   Locally Available)
5. **Indoor Environment**
   (IAQ, Acoustics, Odors)
6. **Facility Operations**
   (O&M Replacements, Diagnostics,
   Flexibility, Access, Cleanability)
7. **Construction**
   (Packaging, Site Waste Mgt., Quality
   Assurance Testing and Start-up)

San Francisco Federal Buildin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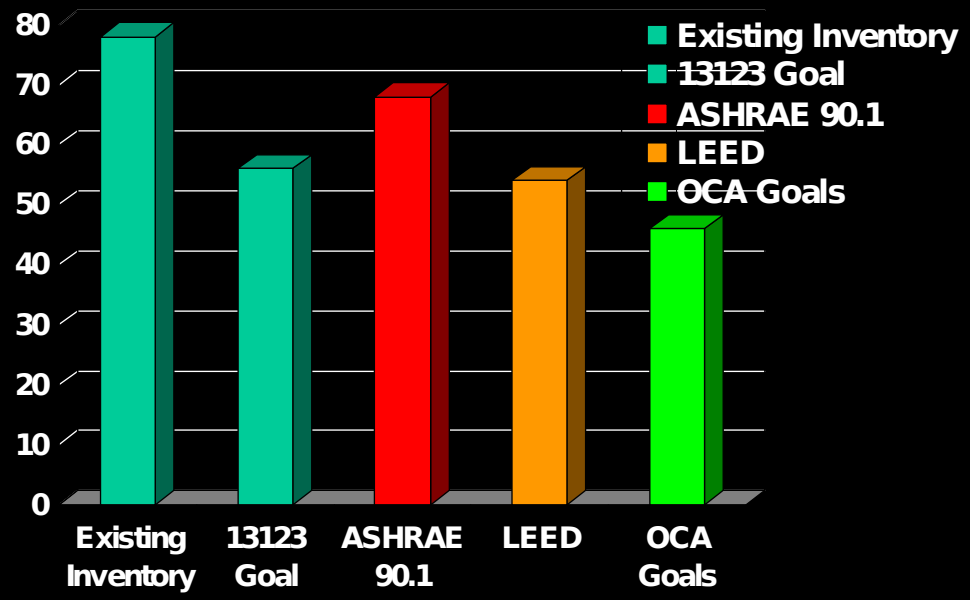
Historic

Energy Efficiency Perspective

Energy Goal Criteria

- **ASHRAE 90.1-1999**
  (CFR 435/434 Equivalent)
- **EO 13123, 35% Reducti**
  (= 55,000 BTU/GSF/Yr.)
- **Energy Star Compliant**
  (Actual Use Within Top 25%)
- **LEED "Silver"**
  (Beat ASHRAE 90.1 for Credits
- **Project Energy Goals**
  (< 45,000 BTU/GSF, 140 kWh/M²)



Of these…

- **GSA Energy Goals and LEED Impacts are Most Demanding**

Study Approach

Selecting LEED Credits

LEED Scenarios: New Courthouse (partial)

SS	SUSTAINABLE SITES						
		PRE.	PRE.	PRE.	PRE.	PRE.	PRE.
		1		1		1	
		1		1		1	
		1		1		1	
		1	1	1	1	1	1
							1
		1		1		1	
		1		1		1	
		1		1		1	1
							1
		1	1	1	1	1	1
		1	1	1	1	1	1
		1		1		1	

Construction Cost Impacts

New Courthouse

	Certified		Silver		Gold	
	1A	2A	3A	4A	5A	6A
$/ GSF	($0.81)	$2.32	($0.10)	$8.96	$2.47	$17.19
% Change	-0.4%	1.1%	-0.1%	4.1%	1.1%	7.9%

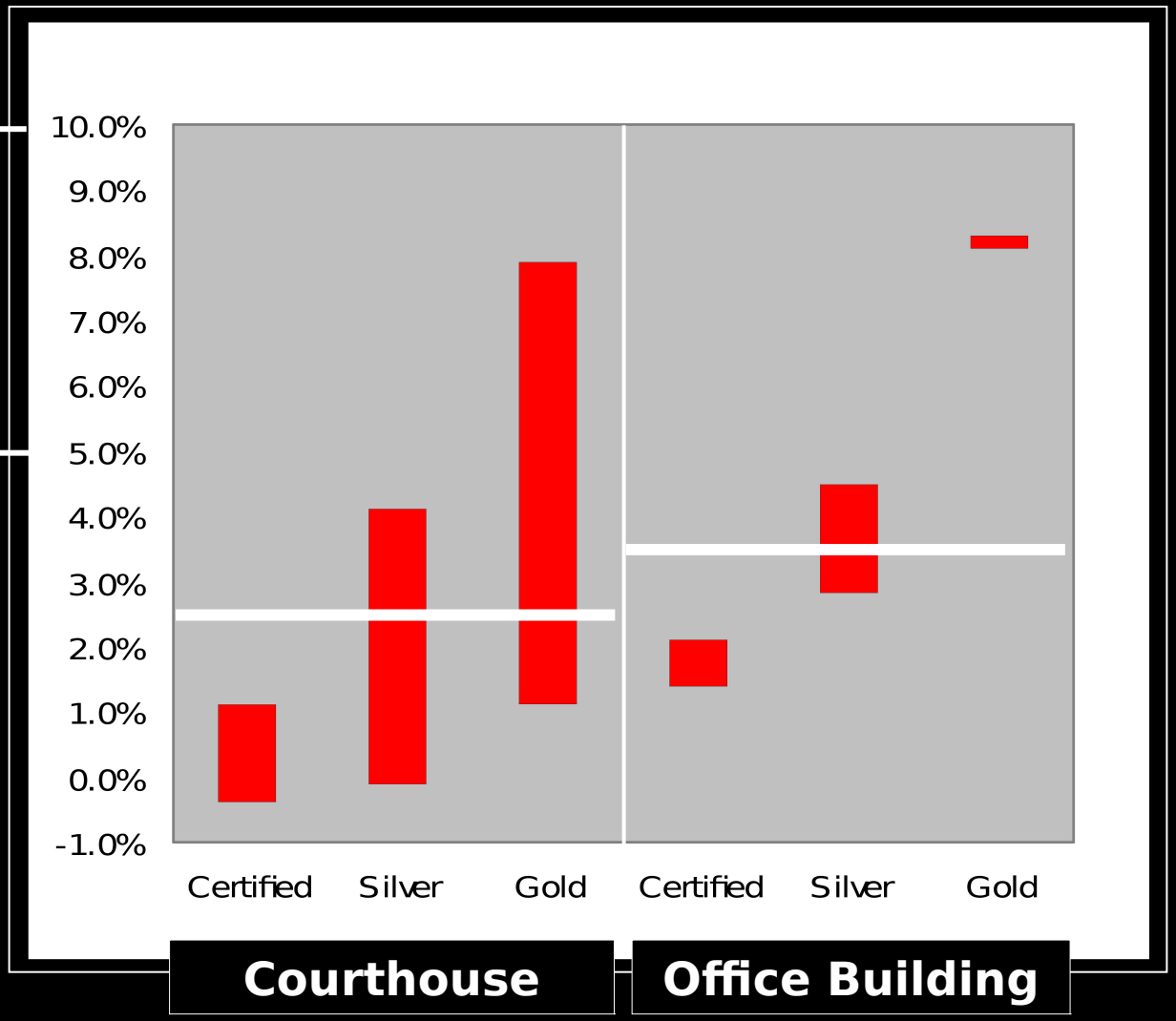
Office Building Modernization

	Certified		Silver		Gold	
	1B	2B	3B	4B	5B	6B
$/ GSF	$1.79	$2.73	$3.60	$5.97	$10.65	$10.65
% Change	1.4%	2.1%	2.8%	4.5%	8.3%	8.1%

Construction Cost Perspective

Design Contingency

Estimating Accuracy



Sustainability Cost Context

Integrated Performance Initiatives

- **Sustainability**
  (Environmental Design-
  Being "Green")
- **Workplace Productiv**
  (Space Equity, Comfort, Flexibilit
  Reliability, Sense of Place, etc.)
- **Terrorism**
  (Levels of Threat: Blast, Small
  Arms, Air-Born, Theft/Assault)
- **Seismic Safety**
  (New FEMA Requirements)
- **Historic Preservatio**
  (Historic Districts, Building
  Element Preservation/Restorati

Systems		Aesthetics	Productivity	Sustainability	Security	Seismic	Fire Safety	Accessibility	Historic Pres.	Oper. & Main.
Foundations						3				
Basement Construction				2	2	3				
Superstructure		2		2	3	3	2	2	2	
Exterior Walls		3	2	3	3	3	2		3	2
Exterior Glazing/Doors	Windows	3	3	3	3	2	2		2	3
	Doors	2	2	2	3	2	2	3	2	2
	Special, Atria	3	2	2	3	2	3		2	3
Roofing	Coverings	2		3	2		3		2	3
	Skylights	3	2	3	2	2	2		2	3
Interior Partitions/Doors		3	2	2	3	2	3	3	3	2
Interior Access Floors			3		2	2	2			2
Interior Finishes	Wall Finishes	3	3	2			2		3	2
	Floor Coverings	3	3	3			2		3	3
	Ceiling Treatments	3	3	3	2	2	2		3	3
Conveyance Systems		3	2		2	2	2	3		3
Plumbing	Fixtures	2		3				3		2
	Dist. And Drainage			2		2		2		2
HVAC	Central Plant		3	3	2					3
	Air Distribution	2	3	3	3		3		3	3
Fire Protection					2	3	3	2	2	2
Service & Distribution	Main Power		2		2	3	2			
	Emergency Power		3	2	3	3	3			2
Light'g & Branch Wiring		3	3	3	3	2			3	3
Communications & Security			2		3		2			2
Equip. & Furnishings	Oper. & Maint.		3	2				2		3
	Food Services	2	2				2	2		2
	Fixed Furnishings	3	2	2			2	3	3	2
Special Building Const.		2	2	2		2	2			2
Demolition & Abatement	Bldg Elements			3					3	
	Hazard Mat.			3						
Sitework - Building Related	Site Prep.			3					2	
	Landscaping	3	2	3	2			2	2	3
	Utilities				2	3	2			2
Other Sitework - Project Related		3	2		2	2	2	3	2	2

What's In the Soft Costs?

- Facilitate LEED Charrette
- Point of Contact
- Technology Advisor
- Develop LEED Action Items
- Materials/Systems Research
- LEED Calculations for IEQ Credits
- Energy Calculations
- LEED Credit Interpretations
- Specification Edits Coordinate LEED Submittals With CM
- Review Contrator Submittals
- Assemble LEED Documentation

Design Team Fees

(With LEED Consultant)

New Courthouse

x $1,000

	Certified		Silver		Gold	
	1A	2A	3A	4A	5A	6A
Design Fee Premium	$83.8	$97.7	$83.8	$120.1	$134.0	$182.5
LEED Documentation & Certification	$22.4	$22.4	$23.6	$23.6	$26.0	$26.0
Soft Cost Totals	$106.1	$120.1	$107.5	$144.6	$159.9	$208.5
Cost Impact ($/GSF)	$0.41	$0.46	$0.41	$0.55	$0.61	$0.80

Office Modernization

	Certified		Silver		Gold	
	1A	2A	3A	4A	5A	6A
Design Fee Premium	$97.7	$99.9	$107.4	$123.2	$184.3	$181.0
LEED Documentation & Certification	$26.7	$26.7	$28.0	$28.0	$30.3	$30.3
Soft Cost Totals	$124.4	$126.6	$135.4	$151.2	$214.6	$211.3
Cost Impact ($/GSF)	$0.41	$0.41	$0.44	$0.49	$0.70	$0.69

Experienced Design Team Fees

(w/o Using LEED Consultant)

x $1,000

New Courthouse

	Certified		Silver		Gold	
	1A	2A	3A	4A	5A	6A
Design Fee Premium	$88.1	$93.3	$88.1	$116.5	$116.5	$160.5
LEED Documentation & Certification	$24.3	$24.3	$26.0	$26.0	$29.5	$29.5
Soft Cost Totals	$112.4	$117.6	$114.1	$142.5	$146.0	$190.0
Cost Impact ($/GSF)	$0.43	$0.45	$0.44	$0.54	$0.56	$0.73

Office Modernization

	Certified		Silver		Gold	
	1A	2A	3A	4A	5A	6A
Design Fee Premium	$78.0	$78.0	$87.7	$11.2	$147.0	$141.5
LEED Documentation & Certification	$28.7	$28.7	$30.4	$30.4	$33.9	$33.9
Soft Cost Totals	$106.7	$106.7	$118.1	$41.6	$180.9	$175.4
Cost Impact ($/GSF)	$0.35	$0.35	$0.38	$0.43	$0.59	$0.57

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• Provide Security for Building Occupants and Assets
• Balancing Security/Safety & Sustainability Objectives
The "Whole Building" Design Approach
The goal of 'Whole Building' Design is to create a successful high-performance building. To achieve that goal, we must apply the integrated design approach to the project during the planning and programming phases. It is necessary for the people involved in the building design to interact closely throughout the design process. The owner, building occupants, and operation and maintenance personnel should be involved to capture their understanding of how the building and its systems will work for them once they
understand that all building systems are interdependent. More
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"Study findings along with an applications guide will be posted on the WBDG in the Spring 2004.

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The “Legacy” Construction Program